CLAIMS

1. A method for encoding n data to be encoded, into data representing a base, comprising:

a setting step of setting said base;

a reconstruction step of reconstructing n data by using said bases;

an error calculation step of calculating an error between said n data to be encoded and said reconstructed n data by using a predetermined error evaluation function; and

a correction step of correcting said base based on said error.

2. The method according to claim 1, wherein at said setting step, at least two bases are set,

and wherein at said reconstruction step, said n data are reconstructed by using said at least two bases, further wherein at said correction step, said at least two bases are corrected based on said error.

3. The method according to claim 1, wherein said base is a one-dimensional sequence of numerical values.

4. The method according to claim 1, wherein said data to be encoded are data $f(x_1, x_2, \ldots, x_k)$ in k-dimensional space distribution, and said data to be

encoded is represented by, using at least one set of k one-dimensional base groups $X_1(x_1)$, $X_2(x_2)$, ..., $X_k(x_k)$,

$$f(x_1, x_2, \ldots, x_k) = \sum_l \prod_k x_{kl}(x_k).$$

5. The method according to claim 1, wherein said code to be encoded are data $f(x_1, x_2, \ldots, x_k)$ in k-dimensional space distribution, and wherein said data to be encoded is encoded to k one-dimensional base groups $X_1(x_1)$, $X_2(x_2)$, ..., $X_k(x_k)$,

further wherein at said reconstruction step, said data is reconstructed, by using said one-dimensional base group, based on

$$\tilde{f}(x_1, x_2, \ldots, x_k) = \prod_k x_k(x_k).$$

6. The method according to claim 1, further comprising a step of determining whether or not said error calculated at said error calculation step has converged, wherein correction at said correction step is repeated until it is determined that said error has converged.

7. The method according to claim 1, wherein said correction step is repeated until said error calculated at said error calculation step becomes equal to or less than a predetermined target error value.

8. The method according to claim 1, wherein at said correction step, said bases is corrected so as to reduce said error calculated at said error calculation step.

9. The method according to claim 1, wherein said data to be encoded are divided based on a predetermined reference, and coding is performed by said divided data.

10. The method according to claim 1, wherein said data to be encoded are converted to a frequency component and then coding is performed.

11. The method according to claim 1, wherein said n data to be encoded are k-dimensional data $w(x_1, x_2, \ldots, x_k)$,

and wherein, to obtain a result y from product-sum operation between said k-dimensional data $w(x_1, x_2, \ldots, x_k)$ and k-dimensional data $A(x_1, x_2, \ldots, x_k)$ based on

$$y = \iint \cdots \int A(x_1, x_2, \ldots, x_k) \cdot w(x_1, x_2, \ldots, x_k) dx_1 dx_2 \ldots dx_k ,$$

said k-dimensional data $w(x_1, x_2, \ldots, x_k)$ are encoded based on the data coding method recited in claim 1, thereby at least one set of k one-dimensional base groups $X_{11}(x_1)$, $X_{21}(x_2)$, ..., $X_{1k}(x_k)$ are obtained, and further, the result y, to be obtained from product-sum

operation between said k-dimensional data $A(x_1, x_2, \ldots, x_k)$ and said one-dimensional base group, is calculated by

$$y = \sum_l \left[\iint \cdots \int A(x_1, x_2, \ldots, x_k) \cdot \prod_k x_{kl}(x_k) dx_1 dx_2 \ldots dx_k \right].$$

12. A data coding apparatus for encoding n data to be encoded into data representing a base, comprising:

setting means for setting said base;

reconstruction means for reconstructing n data by using said base;

error calculation means for calculating an error between said n data to be encoded and said reconstructed n data by using a predetermined error evaluation function; and

correction means for correcting said base based on said error.

13. The coding apparatus according to claim 12, wherein said base is a one-dimensional sequence of numerical values.

14. An image coding method for encoding image data, comprising:

an image input step of inputting an original image having an $x_{max} \times y_{max}$ size;

a setting step of setting one-dimensional base group having a predetermined initial value, $Fx_L(i)$, $Fy_L(j)$(i=0, 1, ...x_{max}; j=0, 1, ...y_{max}, L is a base number);

an image reconstruction step of calculating a pixel value R(x,y) of a reconstructed image based on

$$R(x,y) = \sum_{l=1}^{L} Fx_l(x) \times Fy_l(y),$$

a correction step of correcting a difference evaluation value E between a pixel value f(x,y) of the original image and the pixel value R(x,y) of the reconstructed image based on

$$E = \sum_{0}^{x\max-1} \sum_{0}^{y\max-1} \{f(x,y) - R(x,y)\}^2,$$

and correcting said one-dimensional base group $Fx_L(i)$, $Fy_L(j)$ so as to obtain a minimum difference evaluation value E;

a base group addition step of, if said minimum difference evaluation value E is greater than a predetermined value, adding a new one-dimensional base group $Fx_L(i)$, $Fy_L(j)$ by incrementing said variable L by one, and again performing calculation of reconstruction image and calculation of difference evaluation value E; and

an output step of, if said difference evaluation value E is equal to or less than said predetermined

value, encoding and outputting $\{Fx_0(i),Fy_0(j)\}$ to $\{Fx_L(i),Fy_L(j)\}$.

15. An image coding apparatus for encoding image data, comprising:

image input means for inputting an original image having an $x_{max} \times y_{max}$ size;

setting means for setting one-dimensional base group having a predetermined initial value, $Fx_L(i)$, $Fy_L(j)(i=0, 1, \ldots x_{max}; j=0, 1, \ldots y_{max}$, L is a base number);

image reconstruction means for calculating a pixel value R(x,y) of a reconstructed image based on

$$R(x,y) = \sum_{l=1}^{L} Fx_l(x) \times Fy_l(y),$$

correction means for correcting a difference evaluation value E between a pixel value f(x,y) of the original image and the pixel value R(x,y) of the reconstructed image based on

$$E = \sum_{0}^{x\max-1} \sum_{0}^{y\max-1} \{f(x,y) - R(x,y)\}^2,$$

and correcting said one-dimensional base group $Fx_L(i)$, $Fy_L(j)$ so as to obtain a minimum difference evaluation value E;

base group addition means for, if said minimum difference evaluation value E is greater than a predetermined value, adding a new one-dimensional base

group $Fx_L(i)$, $Fy_L(j)$ by incrementing said variable L by one, and again performing calculation of reconstruction image and calculation of difference evaluation value E; and

output means for, if said difference evaluation value E is equal to or less than said predetermined value, encoding and outputting $\{Fx_0(i), Fy_0(j)\}$ to $\{Fx_L(i), Fy_L(j)\}$.